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A model for a web-based class delivery system

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A MODEL FOR A WEB-BASED CLASS DELIVERY SYSTEM

A Project

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The Faculty of the School of Library and Information Science

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In Partial Fulfillment

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Master of Library and Information Science

by

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ABSTRACT

A MODEL FOR A WEB-BASED CLASS DELIVERY SYSTEMS

by Enid J. Irwin

This project examines various methodologies for delivering online course content and centers specifically on what part MOOs (MUDs Object Oriented) play in the delivery. It examines various methods used by MOOs and how class material is presented in a MOO.

Several online distance learning sites were examined and common components built into a model that fits the current design for the School of Library and Information Science web page at San Jose State University. In addition, a model for the Libr 202 - Information Retrieval class was designed. The model uses web features that are already built into the class; however, two interactive components were added: a chat room and WOO software (Web MOO) sold commercially as The Palace. The free trial version was scripted to represent a study area for students to meet with the professor and TA for discussions on a database application called Inmagic.

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My appreciation for offering the Creative Project Report option is extended to the School of Library and Information Science faculty at San Jose State University. The Plan C option gave me the opportunity to explore distance learning, a subject that has always interested me, within the new medium of web pages and virtual communities.

Both my advisors, Dr. Linda Main and Dr. Judith Tessier, were gracious and knowledgeable with their comments and guidance. In addition, the technical support from Don Tanner and Stanley Laufer was instrumental in working out the glitches inherent in any computer project.

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INTRODUCTION

One of the many challenges facing Library Information Science (LIS) educators is distance learning. The number of library programs has decreased because of shrinking education budgets. Student demand has increased as the need for information specialists grows. However, the distances involved make attending classes difficult, if not impossible for many. Moreover, as the student population ages, many potential LIS candidates find attending classes a burden when they also have responsibilities for children or home-bound parents. Day care is expensive and does not cover all the times when students need to attend classes or meet with classmates.

In addition, many library professionals want to attend classes to obtain a degree/credential or to continue their education for professional advancement, but they are unable or unwilling to leave their jobs. Consequently, their times for attending classes are limited, and course selections may be poor or nonexistent. Not serving these students diminishes LIS programs because students with jobs in the field enhance curriculum with their practical experiences (Stanford, 1997, p. 181).

All of these factors (mixture of fewer programs, increased demand for LIS professionals, time or travel limitations, and working professionals) create a pressing challenge for LIS educators. Since budget cutbacks have already eliminated programs or offerings, LIS schools cannot meet student demands for increased or timely offerings within traditional campus programs. Thus distance education is a solution that many institutions are embracing.

According to The United States Distance Learning Association, distance learning is "the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance" (Yellen, 1997, para. 1). A number of different mediums can be used such as satellite broadcast or multipoint-point video conferencing.

San Jose State University uses a TV-based system with asynchronous transfer mode (ATM) technology to transmit courses between two sites (Stanford, 1997, p. 180). Instead of using broadcast equipment, the public-switched telephone network delivers "near-broadcast-quality live two-way interactive video" (Stanford, 1997, p. 183). This creates an interactive classroom that extends from San Jose to Fullerton. Students meet in classrooms that are equipped with cameras which permit everyone to see each other and carry on live discussions This type of course delivery and interactivity is complex and expensive.

Another alternative, a computer-based system, is used by Old Dominion University. Just as with the SJSU system, students meet at central locations; however, each student sits at a computer workstation equipped with a microphone and camera rather than in a classroom set up with cameras that cover the entire room. In addition to the two way video and interaction, the Interactive Remote Instruction system also supports application sharing and manipulation. Thus students can run experiments or programs interactively. Furthermore, IRI helps students with notes and instructors with lesson preparations. Another advantage is that IRI facilitates class management by letting instructors select students for questions or assignment checking. This setup is less expensive and easier to run than TV-based systems (Maly et al., 1997, p. 82).

For schools and programs faced with budget cuts, the costs of either TV-based or computer-based solutions for distance learning are prohibitive. Each requires an initial investment in equipment and expertise as well as facilities for the classes. Continuous maintenance and operation costs are high; therefore, the Internet has become a viable solution for low cost delivery of courses. Some suggest that the campus of the future will be virtual and exist only in electrons whizzing along the Internet (Brown and Duguld, 1996, para. 7).

As tempting as the Internet seems to be for course delivery, it is not without problems. The major drawback to using the web for courses is whether or not the Internet technologies can support the interactivity needed for learning to occur. Besides the exchange of ideas and questions with instructors, students also need to interact with their peers and members of the professional community in order for learning to be fully realized. Current technologies permit one-to-one or one-to-many communications; however, knowledge communities are based on many-to-many interactions that generally occur only with continuous, face-to-face conversations. Examples of technologies that strive for this level of interaction can be divided into three categories (Brown and Duguld, 1996, para. 39-48).

The first group: newsgroups, usenets, bulletin boards, and listserv mail lists are all based on electronic mail. The advantage of these forms is that they go beyond the one-to-one communication and permit members or subscribers to address a particular interest group. Thus one-to-many communications take on the aspects of a class discussion. In addition, most offer some form of archiving so postings can be searched and recalled. Consequently, the format takes on the appearance of a real-time interchange.

The second type: annotation systems such as CoNote allows posting of comments to web documents (Xerox Design Research Institute at Cornell). CoNote was developed because a Cornell professor noticed that discussions on student class lists were often unfocused. Posting class material to ftp servers gave focus but no way to have many-to-many conversations. CoNote solves the problem by letting students post comments to a web page. Thus instructors can put problems or diagrams in a web page and students can tack on questions or replies that are available for all to read.

Both of these methods keep communication flowing in a simulated classroom setting but fall short of true interactivity. The passion, liveliness, and interest that are part of a class setting is diluted or lost. The third group: shared online environments or MUDs and MOOs address this problem by achieving the interactivity of a real classroom.

A MUD or Multi-User Dungeon (or Dialog or Domain) is a computer program and database that grew from Dungeons Games; it is accessed via network connections. The early MUDs were real-time chat systems that allowed users to log in and engage in fantasy games or adventures. The MUD software allowed users to exchange typed communications, manipulate objects described to them such as swords and dragons, and move through the fantasy environment. Initially most MUDs tended to be one of two types: adventure/combat games or social fantasy interactions.

As the purpose of the MUDs evolved to social exchanges carried on in virtual cities or communities, the software also went through evolutions to TinyMUDs, MUCKs, MUSHes, and MUSEs as features were added to the software. Eventually the model obtaining the greatest acceptance was the MOO (MUD Object Oriented) (Higgins, 1995). Educators embraced MOOs because students were able to interact with one another and the professor by typing messages visible to all. MOOs give instructors a unique method of blending course content and imagination. Furthermore, MOOs are excellent reading and

writing mediums because they stress communication, cooperation, and experimentation which are all important educational skills (Dyrli, 1996, para. 9).

Initial Project Overview:

The initial focus this current project was on setting up a MOO so that the medium could be evaluated for use in a typical core class that is delivered on the Internet.

Initial Project Description:

GOALS:

The project involves building a model for a typical LIS core class that is delivered via the medium of a MOO. The project has two parts:

1. building a classroom;
2. setting up the Libr 202 - Information Retrieval class taught by Dr. Judy Tessier in the MOO. One lecture would be developed in the MOO environment.

OBJECTIVES:

1. The project uses technology to develop a teaching environment for accessing information and learning to understand, assimilate and communicate information as a component of the decision making process.
2. The project fosters a collaborative and cooperative learning community that enhances skills required for teamwork within that community.

PROCEDURES:

As with any Internet project, two pieces of software are needed: the client and the server. The client software which handles the MOO will be the Pueblo browser software; the server software which contains all the programming commands will be TinyMUSH. Building the classroom will involve learning the MOO programming language for the server. The software enables setting up rooms and creating objects. Moving from room to room and manipulating objects involves the client software.

TinyMUSH is loaded and installed on Aspen (an SGI server) with telnet capabilities for remote building. The Pueblo browser software is loaded on the SLIS lab PCs and runs under Windows 95 and Windows NT.

Contribution to Professional Development:

Libraries are looking at MOOs as a resource for virtual reference activities. Many universities and colleges have also set up MOOs for teaching purposes; however, no Library and Information Science program seems to be currently using a MOO for instruction. This project advances the knowledge of the LIS professional community by exploring a new method for delivering information.

Pilot Study:

The initial part of the project involved learning the commands for conversing and moving around in a MOO as well as the software instructions for building rooms and creating objects. This was facilitated by online discussions with Dr. Bob aka Oskar and Dr. Sue aka Maggie at Hallowed Halls (199.67.25.63:7777) In addition, Adam Dray put together a web-based tutorial for several SLIS students called "The Basics of MUSH

Building" (http://www.legendary.org/~adam/mush-building.html). Another helpful tutorial was "What is a MUD, actually?" (http://www.cwrl.utexas.edu/researchpoints/mudhandouts/beginning.html) created by Claire Benedikt. Manuals were also used for the TinyMUSH program (http://www.godlike.com/mushman/) and Pueblo software (http://www.chaco.com/pueblo/doc/mamual/).

After several trials building rooms and creating objects, use of the MOO in delivering course content was obscure. The MOOs are primarily text-based which does offer a good environment for interchange between members of a room; however, conversation between several inhabitants can become rather choppy and hectic with comments overlapping. The context and order of multiple participants quickly seems to break down the logical flow and sense of conversation. The mental image is one of a kindergarten class with the teacher in the hall.

Discussions with Adam Dray and the systems administrator at the Virtual University (http://www.athena.edu/athena.edu) indicated that course content was primarily delivered through email, lists, and web pages. Thus two questions appeared to require answers:

1. If MOOs are not used primarily for course delivery, how and why are they used for postsecondary educational purposes?, and
2. Since online distance learning is offered by an increasing number of colleges, what methods are being used to deliver course content?

As a result of the above pilot study, the project was revised.

Revised Project Description:

GOALS:

The project involves investigating how distance learning course content is delivered and what part MOOs play in the delivery. The project has three parts:

1. a review of literature and web-based class delivery systems;
2. a model web page based on the findings for a distance learning program,
3. a model web page for the Libr 202 - Information Retrieval class taught by Dr. Judy Tessier.

OBJECTIVES:

These remain the same

PROCEDURES:

As a starting point for reviewing online distance learning web sites, a method for evaluating the quality of the sites was needed. Roman architecture critic, Vitruvius, said that well-designed buildings were those that had firmness, commodity, and delight. In his "Software Design Manifesto" (page 5), Kapor says these concepts also apply to software. Firmness is the belief that a program will have no errors that interfere with its use. Commodity is the philosophy that a program will be suitable for its intended purpose. Delight is the expectation that using the program will be a pleasurable experience. The same elements apply to web page design and are especially critical for web-based distance learning. The delivery system must be error free; the content must meet student's learning needs; the experience must be beneficial for the student.

The format best suited for judging the relative merits of web sites on the basis of "firmness", "commodity", and "delight" was the "Criteria for Evaluation of

Internet Resources" developed for a web-based class on Advanced Information Retrieval, a requirement for the MLIS in the School of Communication and Information Management at Victoria University of Wellington in New Zealand (http://www.vuw.ac.nz/dlis/courses/847/m2resevl.html).

Elements used from the Criteria to Review Online Web-Based Programs:

Scope
- What items are included in the resource?
- Does the actual scope of the resource match expectations?

Purpose
- What is the purpose of the resource?
- Is this clearly stated?
- Does the resource fulfill the stated purpose?

Currency
- How frequently is the resource updated, or is it a static resource?
- Does it appear that a commitment to ongoing maintenance and stability exists?

Workability
- Is the resource convenient and effective to use?
- Aspects of workability include:
  - User friendliness:
    - Is the resource easy to use?
    - Are there help functions?
  - Searching
    - How effectively can information be retrieved from the resource?
    - Is a useful search engine provided?
    - Is the resource organized in a logical manner?
  - Connectivity:
    - Can the resource be accessed easily and reliably?
    - Are there special software, password, or network requirements?

Those programs that best fit the Criteria are described in the Review and Analysis of Web Sites in the following section.

REVIEW AND ANALYSIS OF WEB-BASED CLASS DELIVERY SYSTEMS

Existing web-based class delivery systems fall into three categories (or a combination of these categories): software designed for classroom training, MOO (MUD Object Oriented) environments, and web pages.

1. *Software designed specifically for classroom training.* An example is the Symposium Software from Centra Software, Inc. (www.centra.com - product demo account is guest and password is browse.) The course delivery software is coded in Java and runs via an internet connection to the server software. Students connect to the classroom with a web browser such as Netscape. Depending on the number of offerings and the number of users, costs range from $50,000 to $200,000 or more for the software that creates and maintains the courses as well as user license fees.

The advantages of this package are that it allows the integration of several multimedia presentations (audio, video, internet access) within one interface. Furthermore, interactive discussions are coordinated and ordered to simulate what happens in an actual classroom. The randomness and interruptions that happen in chat or MOO applications do not happen. Thus a lecture can be presented in the same manner that occurs in a live classroom where an instructor uses varying instructional tools such as handouts, whiteboard, applications, and video clips with the students interactively reacting to the presentation. Moreover, security issues that might arise on a MOO are automatically handled by the software server which also processes registration and student assessment.

Because the students use a web browser, the software learning curve is extremely short and students are immediately focused on the course rather than connection or procedural commands. Since students access to the classroom with a browser, they can be at any location with any personal computer that has an internet connection; therefore, the cost of a physical facility is not needed. Besides the ability to 'attend' a live class, students can connect to the course materials after class to study. They also have the capability to meet other students to work on group projects. Finally, students are able to perform exercises or take quizzes or tests online.

One major drawback is the cost. In addition to the software, user fees, and support cost, other expenses include personnel such as a programmer/analysts to maintain the servers and assist instructors with course development. On the student side, participants need computers with sufficient CPU speed, adequate memory, large displays, and high quality microphones for optimal performance. Especially critical is having sufficient network bandwidth between the class server and the student otherwise the presentation is slowed.

2. *MOOs*. MUD Object Oriented (or Multiuse Object Oriented) environments are text-based virtual places where any number of people visit simultaneously to converse and learn. All they need is an Internet connection. After MOOs evolved from MUDs, their popularity increased with the public domain release of the MOO server code and the concurrent porting to several operating systems (http://www.itp.berkeley.edu/~engla-cy/rach.html). MOOs are programmed with special software; one example is TinyMUSH. (A detailed manual can be found at ftp://ftp.chaco.com/pub/mud/tinymush/docs/mushman-2.008). The programs that create the virtual reality community as well as the community itself then reside on the server.

Users connect over the Internet via telnet. Using a MOO can be enhanced by a special browser such as Pueblo (www.chaco.com/pueblo).

Although MOOs are used for fantasy games and social meetings, they are popular with educators partially because of this fantasy nature. Several traditional universities such as University of Missouri (www.missouri.edu/~moo/resources.html) and Berkeley (//lucien.berkeley.edu/moo.html) incorporate MOOs into their curriculum. Online virtual universities such as Virtual University (www.athena.edu/athena.edu) and Diversity University (//www.du.org) are based extensively on MOOs. These programs use MOOs primarily for language and writing or drama classes as well as research..

Thus a major advantage of MOOs for communication is that they are not only text-based but also interactive; discussions are in real time. This facilitates dialog especially for research or analyses because conversation threads or ideas are not lost through connection delays such as those that exist with email or lists. The interactivity is vital for distance learning as it allows collaborative learning and fosters a sense of community among the participants (http://www.oise.utoronto.ca/~jnolan/comps/comp3.html).

The community atmosphere is augmented when text-based MOOs are upgraded to include graphical interfaces using HTML tags. A MUD/MOO browser called Pueblo (http://www.chaco.com) facilitates accessing and using MOOs with web page and windows features when the communities are coded to take advantage of Pueblo enhancements. This capability was demonstrated by Meri Rada and Abby Stoner in a special studies project with Dr. Linda Main during the Fall 1997 semester at SLIS. They built several educational community type rooms on the Aspen server which hosts the TinyMUSH software (see Initial Project Description PROCEDURES and Pilot Study).

Another surprising advantage of MOOs is that when students are invisible and seemingly anonymous, they feel more comfortable about expressing their ideas and are more likely to enter discussions than when in a traditional classroom. Since students are not inhibited by silent, visible cues from classmates or instructors, they join in with fewer inhibitions. With everyone having an equal opportunity to talk and be heard, no one student is able to dominate the discussions as often happens in a live class (Fanderclai, 1995, para. 3).

Interactivity and anonymity are strengths of MOOs, yet at the same time they are also weaknesses. Since MOOs are designed for interactivity, students are hard pressed to sit with idle fingers before a keyboard during an online lecture (Fanderclai, 1995, para. 9). Generally MOOs are not good for course content delivery since they are essentially text-based fantasy encounters created with the same software used for MUD adventure games. Content delivery may not always fit a game motif. Attempts at fantasy may detract from learning if the fantasy becomes the center rather than the material. Schools using MOOs as the primary educational vehicle such as Diversity University and the Virtual University deliver class material primarily with lists or email. Others such as Berkeley and the University of Missouri confine the use of the MOO to discussions, scripting, role playing, simulations, and fantasy building or programming.

Although some claim that the anonymous nature of MOOs increases student participation that is sometimes inhibited in traditional classroom settings, one problem that has occurred in MOOs is the occasional antisocial behavior of participants using fictitious names (Turkle, 1995, p. 250). Diversity University says that the MOO experience brings out the worst in even the most staid Ph.D., partly because of the newness of the environment but largely because of the anonymity. Whatever the reason, people almost

invariably do things they would not do if they were held accountable for their actions (http://www.du.org/dumoo/classes.htm).

To limit unwanted actions, some believe procedures and policies for running the MOO need to be firmly established. The University of Missouri (www.missouri.edu/~moo/resources.html) has a well organized procedure for setting up MOO classes and accounts. Their experiences are a helpful resource for setting up a MOO. One source of information on various options for handling problem behavior in MOOs is a panel discussion presented at CHI '94. Suggestions ranged from technological solutions such as canceling accounts of obnoxious users to sociological solutions such as allowing users to set the social norms (Bruckman, 1994).

A second social problem in MOOs is the sequencing of conversations. With everyone talking at once, dialog becomes disjointed and out of sequence creating conversations that lack order and context. Because this situation is contrary to classroom protocol and learning, some MOOs are programmed so that instructors control student responses as they do in a traditional classroom. Students must virtually raise their hands before speaking and antisocial behavior is punished by muting students or even locking them out. Others argue that this control of MOO activities is contrary to educational goals because it is dehumanizing. Along the same lines, some argue that overly structured MOO environments limit creativity (Fanderclai, 1995, para. 10). The belief is that using MOOs as extensions of real life classrooms rather than as an alternative learning environment defeats the purpose of the interactive, exploratory spirit that MOOs were created to advance (Fanderclai, 1995, para. 8).

As mentioned, MOOs have been primarily text-based, however, the move is towards integrating MOO-client technologies into the Web creating Web MOOs or WOOs (Newberg and Rouse, Integrating, para. 7). Not only does this integration make

the MOO visual but it also makes it easier to access and inhabit. Web browsers rather than telnet or special MOO browsers connect to the WOOs. Instead of keying commands, links are clicked to manipulate objects or move around. Also, HTML and HTTP allow using multimedia in the MOO thereby expanding their capabilities (Reim, para. 10).

The current version of Pueblo browser has many of the WOO capabilities. Those communities that upgraded their MUD/MOO building software such as TinyMUSH are able to create what are known as "Pueblo enhanced" virtual worlds which take advantage of HTML and HTTP techniques. Pueblo seems to be a browser that was modified to include WOO features - a hybrid between the older MOO and newer WOO technologies.

The major problem with implementing WOOs is the connection mechanism. The lure of MOOs is that conversations are real time which requires a synchronous connection to the MOO. Thus telnet is the usual mechanism for hooking up because the connection is continuous. The Web on the other hand uses an asynchronous mode. After the Web-client connects to another computer, requests information, and receives a reply, the connection is broken. Another facet of this problem is that the Web-client does not retain data about the configuration status once the hook up is broken. In order for WOOs to handle conversations, these problems of asynchrony and statelessness must be integrated into MOO technologies (Newberg and Rouse, Technical Aspects, para. 3).

Using WOOs rather than the text-based MOOs increases the ability of the instructor to offer course content and exercises. Since lessons can be visual and multimedia used, the delivery of course content becomes more interesting than when presented in the text only environments of MOOs. The disadvantage is the complexity required to plan, coordinate, and program the WOO for presenting class material. If the only goal is making course information available for students, the same effect can be achieved easier with a web page that uses multimedia and JavaScript or Java. If the goal

is to generate real time dialog on particular topics, then the WOO is a better medium than a MOO because it does allow graphics and multimedia to augment the discussions.

Writing source code to upgrade public domain software such as TinyMUSH to create WOOs is difficult and time consuming; however patches are available that contain the fixes for including HTML and HTTP features (http://www.chaco.com). As previously mentioned, the Pueblo browser allows viewing Pueblo enhanced MOOs that are worlds offering special support for the Pueblo client such as clickable exits, objects, and multimedia. Even so, a quick scan of the Pueblo World communities indicate that less than one out of ten take advantage of the web-like enhancements possibly because of the time and effort involved in modifying scripts for existing communities.

As an alternative to building a community on a privately owned system with TinyMUSH and Pueblo, another solution is to is to set up a WOO on the Diversity University using their MOO Web Gateway (http://moo.du.org:8000/). DU also contracts for training, creating, or maintaining WOOs. In addition, they offer assistance with procuring grants for using online communication systems for education (http://www.du.org/duSvcs/svcexamp.html). The cost depends on what services are contracted (http://www.du.org/duSvcs/duSvcs.html). The disadvantage of this is that the contracting party is not able to make changes as rapidly as may be desired. Many universities use DU as a site for their WOO class offerings (http://www.du.org/dumoo/schoolslist.htm). Instructors are able to apply for membership and after an initial training program, request a building permit.

Diversity University is serving as a beta test site for the WebGate system, which allows DU MOO to act as an HTTP server and to provide dynamically created web pages. Thus visitors in the WOO can see exactly what's happening at any moment because

requested changes are shown on the web page. Interactive conversations of the MOO are now interactive visuals of the WOO.

The WebGate system that Diversity University uses is an adaptation of the BioGate system, a web interface for MOOs, from BioMOO (http://bioinfo.weizmann.ac.il:8888/). It is a set of MOO objects and associated MOO modifications that allow the MOO to function as a web server. In addition, some of the objects provided are "viewers" that allow seeing into the MOO via web pages. This is similar to how the common telnet/client interface gives a text window into the virtual world that is the MOO. The key is that MOOs are not, as is often said, text-based virtual reality (VR). It is simply that the only means users had for perceiving their VR world was text. The BioGate system provides the tools for both adding multimedia information to MOO objects, and for allowing users to perceive those objects and their extended associated characteristics (http://bioinformatics.weizmann.ac.il/BioMOO/BioGate/).

A second extensive educational virtual community is the Virtual Online University (http://www.vousi.com) which is the parent company for Athena University (http://www.athena.edu). Although they were off line during the early months of 1998 and are currently not accepting students, their community is again accessible. Athena University is revising their curriculum in order to obtain "officially recognized course credit" for students. The parent organization, VOU Services International, has joined with Groupe Ecole Superieure de Commerce to offer an International Masters of Business Administration (http://www.athena.edu/mbainfo.html).

Athena University seems to be a more structured and traditional environment than Diversity University partially because they are attempting to gain accreditation but also because they are offering degrees rather than just a virtual space to host classes. While DU permits instructors to become builders, Athena University looks more for instructors

to teach in established programs. They look for ways and suggestions to expand their offerings but are more closed compared to DU.

Athena University states they are a Pueblo enchanted MOO while DU uses the WebGate system. Athena University also refers to itself as a VEE (Virtual Education Environment - application of a MOO to education). They further state that their interactions are currently text-based because they use public domain programs; however, their site will soon accommodate a graphical (WWW) front end as well as audio support (http://athena.edu/vee.html). They are following the lead of Diversity University to make their MOO/VEE more web-based. Also like DU, Athena University offers consulting services but the services are more related to educational counseling such as support groups or student evaluation and assessment rather than virtual community building. They offer an extensive list of resources on many subject areas (http://www.athena.edu/Links/).

A third education MOO/WOO that has an extensive community is TecfaMOO (http://tecfa.unige.ch:7777/main/). This is the Virtual Space for TECFA, School of Psychology and Education, University of Geneva, Switzerland. TECFA is committed to educational technology and research. Those with the same goals may apply for membership and building permits. The research at TECFA centers on advanced learning environments rather than development. Because most of the work is done by graduate students or full time researchers, the appearance is not always professional quality; emphasis is content rather than style (http://tecfa.unige.ch/guides/tecfa-server-faq.html). Although they seem to lack the structure and organization of Athena University which offers courses for profit or even DU which offers instructors a virtual space, TECFA's research and sources make an important and creative contribution to virtual communities.

Although it is not entirely educational, another WOO alternative is The Palace (www.thepalace.com). It is primarily a collection of fantasy communities where members

choose an appearance, an avatar, and interact with each other. However, The Palace does offer the option to create an area for training or classes. This area can be restricted to members only and several companies use The Palace for training. English classes at Georgia Tech and the University of Texas use The Place for office hours and composition (http://www.thepalace.com/info/press/news/News29797510.html). The cost is $99 per room that allows 20 members at a time. A commercial version supports 1000 simultaneous visitors.

This software offers a graphical interface where members are represented by images on the screen and conversation appears in balloons over the character who is speaking. Online manuals are offered for users as well as room designers. The server supports links to the Web and multimedia. The Palace is not a web page but rather a separate proprietary environment that operates across the Internet. Palace software is used to browse PalaceSpace while the PalaceServer contains the rooms and regulates traffic into and out of the rooms. Palace rooms may contain Web elements and link to the Web while web pages may link to a Palace through either the Instant Palace (HTML) or the Place browser.

The Palace is a true WOO, a Web MOO. It is a separate software entity, not a MOO that is modified or enhanced like the software that Diversity University uses. In many ways, it is similar to the Symposium educational system (Item 1) discussed earlier; although The Palace is a social WOO that converts to education while the Symposium software is only educational. The backbone of The Palace is server software that interfaces seamlessly with existing web servers and web pages. Therefore, it has a 2D graphical environment where visitors interact in real time. Another feature is the PalacePresents enhancement which is a virtual auditorium for live moderated presentations integrating streaming audio, video, and synchronized delivery of HTML based slide shows

(http://www.thepalace.com/welcome.index.html). This is similar to the tools designed by Schweller to simulate multimedia classroom activities and resources like VCRs and cameras in MOOs/WOOs (http://tecfa.unige.ch/edu-comp/DUJVRE/vol1/no1/building_tools_for_education.text).

3. *Web pages.* These are the most common media for delivering distance learning program course content. They range from plain text to interactive presentations that incorporate a variety of multimedia to enhance the material. Students have few difficulties learning how to access class information and communicate with professors and classmates. Web pages are also the least expensive of the three types of virtual classrooms to implement.

One way to strengthen the interactivity of web-based instruction is to use a number of multimedia tools. In other words, rather than struggle to put mulitmedia and internet connectivity into MOOs, put the MOO or MOO concepts into the web page. In essence this is what Centra did with their classroom training package that is written in Java (Item 1). The Palace uses a similar approach (Item 2). With web pages an interactive presentation can be achieved using Java, JavaScript, and multimedia although it will not have the same real time classroom appearance of the Centra or Palace software.

One of the tools to enhance the interactivity of web pages is software for creating tests and surveys offered by the BioMedia Center for Instruction Computing at Purdue University (//biomedia.bio.purdue.edu). The test software, PerfectMatch, is $99. This package acts as a front end allowing the designer/programmer to create Java applications. A second product is Test Pilot which creates surveys; it is also $99.

Another feature that makes a web page more interactive for distance learning is a link to a Palace room. This WOO software enables an interactive visual discussion to be executed from a web page. The software for this WOO is discussed above in Item 2.

A final software application that allows interactive discussion is chat software. Although many are on the market, the package offered by eShare Technologies (www.eshare.com) is very similar to a WOO. This chat software was developed with distance learning and training as a target audience. It is used by several of the schools taking part in the California Virtual University (www.california.edu) especially Cerro Coso College which offers 17 classes in their distance learning program (http://www.cc.cc.ca.us/cconline/dised.htm).

An advantage of the eShare software is that it allows sequencing control of conversations so some order is given to discussions. This is not available in The Palace. Also unwanted topics can be filtered out. In addition to hosting interactive conversations, the software provides options for searching archives of previous dialogs, creating tours of classes to give students a preview of a course, and developing demonstrations that include graphics. As in The Palace, membership may be restricted with passwords. The cost is approximately $4,000.

A creative and inexpensive approach with chat software is used in the Graduate School of Library and Information Science at the University of Illinois. They combine RealAudio, Telnet, and Netscape which are all freeware into an interactive classroom that runs from a web page. On a course web page, students access Internet Relay Chat or IRC (http://www.irchelp.org/) which allows them to be connected to one another. Students communicate with each other and the instructor via the keyboard while the instructor talks to them over a phone which students hear through Real Audio. This system is used in the library school's LEEP3 program and is very successful. (Schneider, 1998, p. 64).

Evaluation:

Reviews of web-based distance learning setups at various colleges and universities show a basic two page structure. The front page is the introduction for the distance learning program and includes links to information and procedures for students enrolling in any of the online classes. The most common presentation for the links is an image map that is sometimes tied with a table format. The artistry of the some sites is definitely an inducement to students shopping for web-based instruction to stop and investigate the offerings (http://dadistance.fhda.edu/).

Programs whose web presence stood out were those that consistently had two features.

The first feature is an overwhelming concern for students evidenced by the abundance of information and FAQs about such items as distance learning policies, equipment needs, and connection procedures (http://dadistance.fhda.edu/DLCResources.html and http://online.santarosa.edu/catedocs/index.html). Some programs even include self tests so students can determine their commitment to web-based instruction. One considers students' hardware and software capabilities (http://cate.santarosa.edu/catedocs/assessment.html) while a second assesses personal teaching needs (http://zeus.sequoias.cc.ca.us/distance/dlquiz.html). Another offers an online tour of the program using RealAudio integrated with web images (http://online.santarosa.edu/catetour/). In addition, several include examples of how the online classes are presented (http://www.cc.cc.ca.us/ccolsamp/ClassHome.html) so that students know what type of presentation they will get when enrolled. A private company even offers a free sample class on searching (http://www.digitalthink.com/catalog/free/).

As a part of this concern for students, several online distance learning programs offer assistance for professors teaching the courses: general information (http://dadistance.fhda.edu/InfoforDLProf.html), an online class about how to teach online (http://www.cc.cc.ca.us/cconline/facreg.htm), a conference on distance learning (http://online.santarosa.edu/conference/), or classes on how to design online courses (http://ARCVirtualCampus.org/CLASSAVAIL.cfm). One report on distance learning gives rationale for program intent, student services and support, course effectiveness, and the technological mix used to deliver course content (http://vclass.mtsac.edu/distance/report.htm).

Another college noted how careful planning for technology and student services increased enrollments through student satisfaction (http://dadistance.fhda.edu/DLCEnrollments.html). Others publish usage statistics for classes (http://online.santarosa.edu/stats/index.html) or graphs on web server usage (http://bctv.butte.cc.ca.us/report/) allowing instructors to monitor student activity. All these services and reports facilitate instruction which in turn benefits the students. They also add weight to the fact that a successful online distance program necessitates diligent and thorough planning, organization, and monitoring.

The second feature of programs whose web presence stood out is the organization of the material. The distance learning web pages are separate from the main school page and have their own home page although a link is present between the homepage for the traditional session and the distance learning program. Similar topics are grouped in meaningful categories with obvious links. Any question that a distance learning student can have about the program is either answered or information is present on how to obtain that answer. Structure of the sites are well planned with student needs in mind.

With more schools entering the distance learning arena, competition for students will become more intense. Students will have many choices and will not take classes from a school whose distance learning program has a poor web presence. Since one reason distance students use this educational option is for convenience, that concept of convenience and accessibility must extend to the web pages that represent the virtual campus.

Several colleges whose programs and web pages stand out are Santa Rosa (http://online.santarosa.edu/), Cerro Coso (http://www.cc.cc.ca.us/cconline/dised.htm), Foothill-De Anza (http://dadistance.fhda.edu/), and Butte (http://bctv.butte.cc.ca.us/). Santa Rosa uses a MUD, gives students a guided tour of their program, has an online self assessment quiz, and offers extensive help and FAQ pages. Cerro Coso uses eShare chat capabilities as well as discussion and news groups, gives a tour of a class, offers online registration and book orders, and has many information pages. Foothill-De Anza offers TV classes, mixed video/audio program strategies, and online courses; allows online application and registration; and has resources for instructors as well as students. Butte has a well structured site that includes a mission statement, disclaimer, and statistics on web page usage as well as information links for students.

Judged by the "Elements used from the Criteria to Review Online Web-Based Programs" at the end of the Introduction, none of these sites is perfect. However, they do represent different styles and methodologies that show careful planning so that the organization of the material creates an atmosphere that is cognizant of student needs. Consequently, various features of these web pages were used to create the model distance learning home page and the model class page discussed in the Procedures in the following section.

PROCEDURES

In order to appear seamless with the design for the SLIS web pages, the model for the Online Distance Learning Program (ODL) follows the same format as the current school home page. The SLIS logos were altered in Photoshop to reflect the ODL Program. The larger gold brick button was fixed to eliminate color inconsistencies present in the SLIS web pages. Other minor discrepancies in the SLIS layout were also changed to reflect better human-computer interface principles. HTML tags were coded by hand or with HTML Assistant.

The same structure is used for the ODL Program so the categories of Administrative, Computing, Professional, Courses, People, and Projects apply; however, the material these categories contain differs from the SLIS home page. For the ODL Program, the categories contain information pertinent to online learning. In the model, moving the mouse over the category name in the logo brings up a screen that lists what items are generally included. These topics were selected by examining web pages for online programs and noting common components. The only active link on the model home page is the one for the Libr 202 - Information Retrieval class taught by Judy Tessier.

Contents of SLIS Distance Learning Program Model Web Page

I. Administrative
   - A. Welcome Message
   - B. Mission Statement
   - C. Disclaimers
   - D. On-line Program Calendar
   - E. Admissions Information
   - F. Self-assessment Test
   - G. Registration Procedures
   - H. Bookstore Procedures
   - I. FAQs

II. Computing
   A. On-line program computer set up
   B. Hardware requirements for students
   C. Software requirements for students
   D. Computer policies and standards
   E. How to access on-line classes
   F. How to get computer accounts
   H. How to get email and listserv memberships
   I. Computer FAQs

III. Courses Link
   A. Course schedules
   B. Course descriptions
   C. Textbook and materials requirements
   D. Fees and payment procedures
   E. Tour of example on-line class

IV. Professional
   A. SLIS resources for on-line program students
   B. Other resources for on-line program students
   C. Connection to school home page

V. People
   A. Important names, phone numbers, and e-mails
   B. On-line program faculty, staff, and administrators
   C. On-line program student mentors
   D. On-line program alumni

VI. Projects
   A. On-line program class projects
   B. On-line program student employment project.
   C. On-line program student graduation projects

The model for the class page is patterned after the web page designed for Dr. Loerstscher's Libr 262 - Resources for Young Adults class. The page format uses a table with appropriate links listed in a column on the left; the remaining two thirds of the screen on the right contains the green sheet. The design was first suggested by Pam Murnane

during the summer of 1997 in Libr 298 lab assistant class and the coding techniques worked out jointly.

Some of the links used in the model for the Libr 202 class were suggested by Dr. Judy Tessier. They are items currently used in the class such as photographs of students, course readings, test examples, and instructions for downloading InMagic and joining the Libr 202 listserv. These were all contributed by the many SLIS students who worked as lab assistants in Libr 298. A link is also provided to an online postcard exercise form coded by Dinah Sanders. This is a web page version of a class exercise.

Several additional links were added to complete the model for the online class. They include assignments, a sample lecture, and online exam form, downloading Acrobat Reader, and a help page. The sample lecture and online exam form are included to show how JavaScript and forms can be used to increase interactivity of a course web page. In the sample lecture, the Searching Model diagram was drawn in Microsoft Paint, scanned as a TIFF file, and then labels added and the image cleaned up in Photoshop. This procedure was used because the image scanned in from the current class handout was not a crisp diagram. The link for downloading Acrobat Reader is provided because the assignments and sample lecture use PDF files. Another possible structure for downloading the Reader as well as InMagic might be to have a separate page for downloading any software needed for the ODL Program. This page can then be located under the Computing section off of the ODL home page. The Help page contains information for the Lib202 class.

The remaining two links included in the model class page are links to iaChat and The Palace software. The iaChat is set up as a study hall to discuss course readings while The Palace is set up for discussions on InMagic. Their functions were selected to show the capabilities of the software. Both are discussed in more detail below.

Although multimedia features for audio and video are not included in the model, doing so will certainly increase the functionality of the web page. Downloading large video files takes time. Testing downloads from the Symposium demo page (www.centra.com) indicated that a one minute, eight megabyte clip took almost four minutes from clicking the link to playing the image in the SLIS lab. Students working at home will have even slower download times. The trade off is that using small clips can greatly enhance a lecture and a student's understanding. If multimedia is included in the web page, hardware and software are needed for converting and/or editing the audio and video clips. Researching and working out the details could make an interesting Libr 298 special study project.

Contents of Libr 202 - Information Retrieval Model Web Page

Photos
Readings
Assignments
Postcard Exercise
Test Examples
On-line Exam
Sample Lecture
Join 202 Listserv
Download InMagic
Get Acrobat Reader
Study Hall Chat
The Palace InMagic
Help

Procedures for Scanning PDF Files

Assignment sheets and lecture handouts were scanned into PDF files using the AFGA DuoScan attached to Salton.

The paper to be scanned is placed face down with the top of the document at the latch or front edge. With the scanner turned on (button, right front), start Adobe Acrobat Exchange from the Windows 95 Start menu.

From Acrobat Exchange File menu, select Scan.

From Adobe Acrobat Scan box,
Scanner: FotoLook NT V2.08 - Twain protocol
Document Type: Single Sided Page
click Scan

On the FotoLook program page, set
Original: Reflexive,
Mode: Line art,
Input: 100 to 300 ppi
Scale; 100%
Size: 8 by 11 inches
Range: Threshold

Click Scan.

Note:

1. The ppi setting depends on the quality of the handout. A higher number creates a better image; however, the added density increases the file size.

2. To change the red scale to inches, click outside of the ruled area. Each click brings up another scale such as cm. (centimeters) or mm. (millimeters).

3. Make size selection from drop down Size menu. If desired size is not available, place cursor in upper left corner of grid so that cursor becomes a cross hair. Click and drag cursor down to form a rectangular box. Adjust box position by placing cursor inside of the box. When cursor forms crossed arrows, click and hold. Move cursor to position box.

4. The manual for the FotoLook software and AFGA DuoScan is missing.

PDF files are a good medium because scanning is easier than editing Word files that are saved as HTML documents. Also, Acrobat Reader has a magnification setting so users can easily set the image size for their eyesight. Since many SLIS students are older, this can be a helpful feature especially for distance students who may spent more hours on a terminal than regular students. Additionally, PDF files are easy to print.

Although not investigated in this project, links can be added to PDF files. Thus links can be set from places in the document to Internet sites or instructor's notes. This feature adds interactivity to the web pages used for lectures. Researching and working out the details could make another interesting Libr 298 special study project.

Procedures for Installing iaCHAT Software

The iaChat software is free Java web-based chat software developed by International Communications Enterprise, Inc. and downloaded from their web page (www.ice-network.com). It works with any Java enabled browser and does not require additional software. iaChat is based on a client/server model so a Java proxy server runs at a central system and is connected to the client web page via Java scripts inserted in the HTML (http://www.ice-network.com/javachat/faq.htm). Dr. Linda Main received notice of the software and a companion calendar program via email.

Two of the features the software has are multiple chatrooms per website and multiple topics per chatroom. In the model for Libr202, the chat room was set up as a study hall for discussing the readings. Each category of papers was assigned a different room. Conversations can be moderated by joining the chat room as a moderator (moderator information listed below) and administration of the software is through a window type menu and form.

Although specific users or IP access can be denied, users currently in the chat room can not be logged off nor can messages be sent to a specific user by the moderator (Scott Kim scott@ice-network.com). Communication with the company indicated that they would consider modifying their chat software for SLIS needs and were interested in the results of any trial use of the iaChat software.

Data for iaChat Administration:

Website Identifier: LIBR202
Website Password: SLIS

Moderators:

Name	Password
Main	prof1
Tessier	prof2
Irwin	student

Procedures for Installing The Palace

The Palace software has two parts: a client and a server.

The client is the browser that is used to connect to Palace installations. The browser usually runs as a separate application; however, it can be executed from a web page link (Example: palace://senna.sjsu.edu). Users without the Palace browser can also connect to Palace installations through a web page link when the Palace server uses InstantPalace Java software and HTML files (Example: http://senna.sjsu.edu/SLISpalace/instantpalace/instantpal.html). Thus the InstantPalace client integrates seamlessly into IE and Netscape browsers and is accessible by clicking on an URL. The advantage of the downloadable Palace client over the Java version is that it optimizes access speed to room graphics and allows end users to author their own avatars (http://www.thepalace.com/products/client/index.html).

The PalaceServer software provides web developers with a set of tools to add live multi-user communication to websites. PalaceServer 4.0 supports UNIX and NT. It also includes PalacePresents, an auditorium for live moderated events, as well as support for InstantPalace; a Java based version of the Palace client. The commercial version supports 100-1000 simultaneous users while the Personal Server supports 20 simultaneous users (http://www.thepalace.com/products/server/index.html).

For the project, the PalaceServer 3 User Trial Version for Sun Solaris (see URLs at end of this section) was downloaded onto senna at /opt/PUBchttpd/htdocs/eirwin as:

pserver-4.0.1.sparc-sun-solaris2.5.1.tar.gz.

It was unzipped:

gzip -d file_name

This created a tar file:

pserver-4.0.1.sparc-sun-solaris2.5.1.tar

It was untarred:

tar -xf thepalace.tar

The Palace was installed with:

./install

The install program output and parameters were captured as

install-log-irw

The Palace execution files were installed to directory:

/usr/local/palace

Two parameters in the pserver.conf file were edited in pico:

SCRIPTFILE "SLISpscript"
FRONTEND "9998" "130.65.75.38"

The SLISpscript file contains the room descriptions and activities.
9998 is the default port for The Palace.
130.65.75.30 is the address of senna.

SLISpictures is the directory containing graphics for the SLSIscript file.
It is located at: /usr/local/palace/pub

The original room description file is pscript.
The original graphics directory is pictures located at /usr/local/palace/pub.
The original pserver.conf file is bkup-pserver.conf.

Note that editing the pserver.conf file does not affect the InstantPalace HTML files. They are located at:
/usr/local/palace/pub./usr/local/palace/pub/instantpalace.
The instantpal.html file must be changed to reflect new directories for picfolder (SLISpictures), soundfolder, and avatars.

The web server systems administrator must set up an alias so that The Palace and the web server are integrated. Therefore, all files that the web server will use are placed in /usr/local/palace/pub.
Symbolic link: http://senna.sjsu.edu/SLISpalace/
Physical link: /usr/local/palace/pub

The Palace server is started with:
./bin/pserver

If it is necessary to edit the pserver.conf or SLISpscript files, the server must be shut down otherwise the changes will not be accepted. This sequence of steps is:

ps -ef	to get the process ID number
kill <number>	to stop the server
pico file_name	to edit the file
./bin/pserver	to start The Palace

Note that the paid version of the browser ($40) can be used to edit many of the room descriptions. Also, the documentation recommends editing the files and developing scripts with the Palace Personal Server so that actual Palace server is not shut down disrupting users.

When it is running, The Palace keeps three log files on activity. They are:
chat.log.date
pserver.log.date
psfront-130.65.75.38-9998.log.date
(Date is a 6 digit number - example: 980409)

The web link to start the browser is:
palace://senna.sjsu.edu

The web link to start the InstantPalace is:
http://senna.sjsu.edu/SLISpalace/instantpalace/instantpal.html

The web pages for the model that uses The Palace are located at:
http://senna.sjsu.edu/lmain/dl/model.htm

The physical directory for the web pages is:
/opt/PUBchttpd/htdocs/lmain/dl/model.htm

For the project, The Palace client browser for Windows 95/NT Version 3.3 was downloaded and installed on Atlantic, Zeider Zee, and Marmara. The downloaded file (palacesetup.exe) was placed in the C:\IRWIN directory on Atlantic. Using Windows NT Run option from the Start menu, the file palacesetup.exe was opened and installed to directory C:\PALACE. Since an icon was not placed on the desktop, The Palace browser is executed from the Start Menu Run option. The file to run is palace32.exe.

Its social and fantasy capabilities make The Palace a creative and relatively inexpensive medium for education. It has the openness of public domain MOO/WOO software yet has controls built into the server configuration thereby minimizing abuses that have occurred on educational MOOs. Unwanted commands can be controlled by settings in the configuration file. Also, access can be limited by passwords and avatars that represent the members rather than an anonymous fantasy character. A second advantage is that users are able to navigate the Palace environment without having to learn commands because everything is menu driven or clickable in either the browser or Java version. Users are able to view multimedia events or share applications as well as communicate with others. A log is kept of activities for later viewing. A final advantage is that much of the coding for The Palace appearance can be accomplished through the browser with its Windows like interface. This simplifies coding and speeds development.

Several universities and colleges have successfully used The Palace (http://www.thepalace.com/developersite/sales/accounts/education.html). Georgia Tech has online office hours and virtual study group meetings and collaborations. Professor Gregory VanHossier-Carey of the School of Literature, Communications and Culture uses The Palace as a distance learning solution for writing and humanities courses. At Syracuse University, Dr. Mike Eisenberg, Professor and Director of the Ask ERIC project, uses The Palace for distance learning in order to provide graduate instruction in an interactive environment to a geographically dispersed student body. Previously students worked with correspondence courses, conference calling, electronic bulletin boards, and other forms of asynchronous communication. Dr. Alan D. Evans, Director, Instructional Resources Center at Kent State University, states that they are developing a distance learning model for teacher/staff development that will use The Palace for virtual office hours and counseling sessions.

IMPORTANT PALACE LINKS USED FOR DOWNLOADS AND INSTALLATION

Information on Palace products:
http://www.thepalace.com/products/index.html

Information on downloads:
http://www.thepalace.com/downloads/index.html

Information on downloading client software:
http://www.thepalace.com/downloads/index.html#consumer

Information on downloading PalaceServer 3 User Trial Version:
http://www.thepalace.com/downloads/index.html

Information on support and manuals:
http://www.thepalace.com/support/index.html

PalaceServer Manuals
- PalaceServer Guide for UNIX
- Palace Wizard Guide
- Understanding Iptscrae
- Palace Presents Moderator's Guide
- Palace Personal Server Guide for Windows 95/NT
- Palace Personal Server Guide for UNIX

Palace User (Client/Browser) Manuals
- Palace User's Guide for Windows 95/NT
- Palace Wizard Guide
- Understanding Iptscrae

CONCLUSIONS

Two basic types of distant learning technologies exist: those that deliver course content from a central source and those that allow students as well as teachers to interact with information from many sources including the students themselves. This second environment gives students an active part in shaping their learning community thereby increasing motivation and improving comprehension (Yellen, 1997, para.4-5).

MOOs are such a collaborative learning environment. In MOOs the physical classroom is no longer the focus of activity. Instead, a virtual space where participation is mandatory becomes the center of learning. At the center are the students while the faculty and administrators are at the periphery. Thus successful online distance learning uses peer to peer learning, access to resources, and experience sharing to replace teacher centered modes of course content delivery (Nolan, 1995, para. 10). MOOs have the capability to empower students by offering them experiences not available in traditional classrooms (Fanderclai, 1995, para. 14).

At the same time, care must be taken to ensure that the MOO is not merely a technological replacement of the classroom (Cross and Fuglevik, para. 8). Sharing, exploring, and collaborative learning must be part of the MOO environment. Merely duplicating face to face instruction is inadequate; the powers of the computer should enhance what occurs in the classroom not merely mimic the classroom. (Turoff, 1995, para. 3). Interactivity is the key. This means a community where active participation and interaction for sharing ideas and information between students and faculty is fostered and encouraged to grow (Turoff, 1995, para. 8).

Both students and faculty are equally responsible for the success of online interactive learning communities. Students who normally may not participate in a

traditional classroom must contribute in a MOO. Instructors may need to learn new teaching skills and/or attitudes so they can offer students learning experiences that take advantage of the technology's potential. Teaching and learning in an interactive online program using MOOs is a partnership.

In order for this partnership to succeed, careful planning and organization must go into setting up the MOO environment. This involves determining goals and objectives, establishing policies for security and student behavior, documenting procedures, backing up and maintaining software, and allowing for growth and development (Cross and Fuglevik, Table of Links). Faculty commitment is paramount. Building an online program without adequate planning and participation by faculty will only create a chaotic environment that is not enjoyable to either teach in or learn in.

It is thus crucial to ensure that faculty have both technological and administrative support so that they are free to prepare lessons that take advantage of the MOO environment (Burruss, 1993, para. 9). Several online aids for faculty are discussed in the Evaluation section of Review and Analysis of Web-Based Class Delivery Systems. Professors who are developing content for a different medium should not also be burdened with putting courses into the online delivery system. Thus a programmer/designer should be available for the faculty. This individual could additionally manage the server and software needed for the system. Furthermore, the programmer/designer could employ graduate assistants to help with the programming, design, and course delivery thereby offering them valuable experience for the job market and gaining a committed work force in return.

Whatever the design or how much planning goes into the program or courses, when prospective students first look at an online distance learning program website, their immediate impression will be formed by the appearance or ascetics of the page. This

impression will be further strengthened or altered by their ability to navigate the site and find information that is important to them. If they have problems, students are not likely to consider that institution for their distant learning goals: the excellence of the courses or professors may never enter into the judgment because the program was rejected at an earlier decision making level.

The delivery system must be simple and error free as possible; the content must meet students' learning needs; the experience must be beneficial for the student. So when the Roman architecture critic, Vitruvius, said that well-designed buildings were those that had firmness, commodity, and delight, he must have looked into the future to see the virtual campuses of the Internet.

ANNOTATED REFERENCES

Printed Materials:

Harasim, L. M. (1990). Online education: an environment for collaboration and intellectual amplification. In L. M.. Harasim (Ed.), Online Education: Perspectives on a New Environment (pp. 39-64). New York: Praeger.

Discusses the collaborative learning perspective. Explores five characteristics of online environments as well as needed additions for group discussions and collaboration.

Harasim, L., Hiltz, S. R., Teles, L., and Turoff, M. (1995). Learning Networks: A Field Guide to Learning and Teaching Online. Cambridge, Mass.: The MIT Press.

Discusses the field of learning networks in schools and higher education. Gives a guide for designing and implementing learning networks as well as teaching and learning online. Discusses problems and future possibilities.

Hiltz, S. R. (1990). Evaluating the virtual classroom. In L. M.. Harasim (Ed.), Online Education: Perspectives on a New Environment (pp. 133-183). New York: Praeger.

Discusses the implications of computer mediated communication for distance learning on teaching methodology, learning resources, faculty instruction techniques, and student learning behavior.

Kapor, M. (1996). A software design manifesto. In T. Winograd (Ed.), Bringing Design to Software (pp. 1-9). Menlo Park: Addison-Wesley.

Discusses the importance of software design as part of the user interface. States that it is also an integral part of the development process. Concludes that poor design affects usability.

Mason, R. and Kaye, T. (1990). Toward a new paradigm for distance education. In L. M. Harasim (Ed.), Online Education: Perspectives on a New Environment (pp. 15-38). New York: Praeger.

Discusses the implications of computer mediated communication for distance learning on teaching methodology, learning resources, faculty instruction techniques, and student learning behavior.

Schneider, K. G. (1998, February). Internet librarian - a giant LEEP forward. American Libraries, 29(2), 64.

Describes teaching a graduate library school course at the University of Illinois in their LEEP3 scheduling option using the internet and RealAudio software for interactive phone connections.

Stanford, S. W. (1997, Summer). Evaluating ATM technology for distance education in library and information science. Journal of Education for Library and Information Science, 38(3), 180-190.

Develops a reliable and valid evaluation instrument for a distance learning program. Concludes that class discussions over distance are difficult and students desire more face-to-face contact with professors.

Turkel, S. (1995). MUD rape: only words?. In Life on the screen : Identity in the age of the internet (pp. 250-254). New York: Simon & Schuster.

Discusses the potential and reasons for antisocial behavior that occurs in chat rooms or MUDs when participants are anonymous and not accountable for their actions.

Printed Materials Available Online:

Besser, H. (in press). Difficulties of implementing and maintaining a worldwide web site to support instruction. Revue Informatique et Statistique dans les sciences humaines [Online].
Available: http://www.sims.berkeley.edu/~howard/Papers/Restricted/belgium.html.

Describes various problems encountered when using a website for delivery of course materials and student activities. Management issues include permission control, multiple contributors/collaborators, physical arrangement of files, ownership and maintenance of files, and presentation to end users. Social and policy issues include currency and archiving, privacy, and reliance on technology.

Besser, H. (1996, November). Issues and challenges for the distance-independent environment. Journal of the American Society of Information Science, 47(11) [Online].
Available: http://www.sims.berkeley.edu/~howard/Papers/Restricted/hbjasis.html.

States that the installation of an interactive distance education classroom requires careful planning in technical capabilities so that delivery vehicles match the levels of selected interactivity. Outlines various infrastructures and the resources needed. Concludes that these environments require support personnel and rethinking teaching strategies.

Besser, H., & Bonn, M. (1996, November). The impact of distance-independent education. Journal of the American Society of Information Science, 47(11) [Online]. Available: http://www.sims.berkeley.edu/~howard/Papers/Restricted/mbjasis.html.

Discusses motives behind the movement to distance independent learning, impact on instructors and the instructor community, impact on student experience. Raises questions about appropriate subject matter, context, and teaching methodology.

Brown, J. S., and Duguid, P. (1996, July-August). Universities in the digital age [Online]. Change, 28(4), 10-19. Full text from: DIALOG File: IAC Business A.R.T.S. Item: 04029885.

Cautions that a focus on distance and delivery overlooks not only students but also the technology. Calls for creative methods to achieve true interactivity and move away from traditional one-to-many or one-to-one modes. States that unless the needs of distance students are met with interactive communities, the technologies used to deliver class will be underexploited and true learning is not achieved.

Bruckman, A., Curtis, P., Figallo, C., and Laurel B. Approaches to managing deviant behavior in virtual communities. Proceedings of CHI '94 [Online]. Available: http://www.oise.on.ca/~jnolan/muds/about_muds/asb/dev

Gives opines of four panel members with MUD experience on various options for dealing with and controlling socially inappropriate behavior on MUDs.

Burress, B. G. (1993, Fall). Increasing enrollments. The Agenda [Online]. Available: PBS Adult Learning Service - http://dadistance.fhda.edu/DLCEnrollments.html.

Notes how careful planning for technology as well as student and faculty services increased enrollments through student satisfaction.

Dyrli, O. E. (1996, May-June). Educational MUDs, MOOs, and MUSEs [Online]. Technology and Learning, 16(8), 20. Full text from: DIALOG File: IAC Business A.R.T.S. Item: 03943503.

Explains the use of MUDs in education and how learning is facilitated by describing student activities in a MUD or MOO. Gives examples of several educational sites and their connection procedures.

Fanderclai, T. L. (1995, January). MUDs in education: New environments, new pedagogues. Computer-Mediated Communication Magazine, 2(1) [Online]. Available: http://sunsite.unc.edu/cmc/mag/1995/jan/fanderclai.html.

Notes that students feel more comfortable expressing themselves in a composition class behind the safety of an anonymous MUD character. Also states that attempts to make MUDs appear as a traditional classroom destroys the creative interactive intent of the MUD and makes it a mere gimmick.

Maly, K., Abdel-Wahab, H., Overstreet, C. M., Wild, J. C., Gupta, A. K., Youssef, A., Stoica, E., and Al-Shaer, E. S. Interactive distance learning over intranets. IEEE Internet Computing, 1(1), 60-71 [Online]. Available: IEEE Digital Library - http://computer.org/internet/ic1997/w1toc.htm

Describes the Interactive Remote Instruction system at Old Dominion University used to deliver distance classes as a computer-based rather than television-based system. The setup allows two way video, on-the-fly interaction, and application sharing via computer workstations.

Swaine, M. (1995, November). Meeting in the MUD [Online]. MacUser, 11(11), 135. Full text from: DIALOG File: IAC Business A.R.T.S. Item: 03689188.

Discusses the fantasy and role playing aspects of MUDs. Indicates that despite the game playing features, MUDs are good for business conferences and educational purposes because they allow and facilitate collaborative construction.

The web and distance learning: what is appropriate and what is not. In P. B. Lawhead (Chair), Report of the ITICSE '97 Working Group on the Web and Distance Learning (pp. 27-37) [Online]. Available: ACM Digital Library - http://www.acm.org/pubs/citations/proceedings/cse/266057/p27-lawhead/

Explores motivations for developing web-based distance learning and examines various issues. Analysis takes a learner-centric viewpoint.

Online Materials - General:

Alexander, S. Teaching and learning on the world wide web [Online]. Available: http://elmo.scu.edu.au/sponsored/ausweb/ausweb95/papers/education2/alexander/

Observes that new teaching technologies often fail to live up to their promise and discusses reasons for this failure. Analyzes different approaches to teaching on the web that range from using documents with links to interactivity, collaborative authorship, and finally multiple internet services. Relates these approaches to teaching and learning strategies.

Criteria for evaluation of internet information resources [Online]. Available: http://www.vuw.ac.nz/dlis/courses/847/m2resevl.html

Lists and explains criteria including scope, authority, accuracy, purpose, use, currency, uniqueness, workability, and connectivity.

Educational Resources by Subject [Online]. Available: http://www.athena.edu/Links/

Lists links to Internet resources on many subjects. Includes library science, K12, searching the internet, and distance education.

Eklund, J. Cognitive models for structuring hypermedia and implications for learning from the world-wide web [Online]. Available: http://elmo.scu.edu.au/sponsored/ausweb/ausweb95/papers/hypertext/eklund/index.html
Discusses designing computer-based environments for learning. Describes cognitive models for structuring hypermedia and their implications for learning from the world-wide web. Lists methods to maximize learning from a web environment.

Mt. San Antonio College 1996 Distance Education Report [Online]. Available: http://vclass.mtsac.edu/distance/report.htm
Gives rationale for program intent, student services and support, course effectiveness, comparative costs, and the technological mix used to deliver course content.

Nolan, D. J. Over Schooled and Under Educated [Online]. Available: http://www.oise.utoronto.ca/~jnolan/comps/comp2.html
Discusses the negative impact of computers and learning as well as what is good about online learning. Considers what online learning should accomplish and how an electronic learning community should look.

Nolan, D. J. Research into Educational Computer Mediated Communication [Online]. Available: http://www.oise.utoronto.ca/~jnolan/comps/comp3.html
Outlines two proposals that investigate MUDs. The methods discuss MUDs in qualitative and quantitative analyses. The first considers MUDs as dynamic environments for learning and the second considers them as environments for learning community and writing skills.

Training Central: Corporate Education Research Centers [Online]. Available: http://www.centra.com/distance/deicorp.htm
Indexes different corporations that support distance education research.

Training Central: Organizations [Online]. Available: http://www.centra.com/distance/deiorg.htm
Indexes both government and non-government organizations that focus on the development of education technologies and distance education.

Training Central: Tips & Techniques [Online]. Available: http://www.centra.com/distance/knowledge/tips.htm
Lists tips and techniques for teaching and preparing online course materials.

Training Central: Training Tools and Strategies [Online]. Available: http://www.centra.com/distance/cooltool.htm
Indexes organizations that offer online training tools and technologies.

Turoff, M. Designing a Virtual Classroom [TM] [Online]. Available:
http://elmo.scu.edu.au/sponsored/ausweb/ausweb95/papers/hypertext/eklund/index.html
Reviews the software functionality that evolved at the New Jersey Institute of Technology to create a Virtual Classroom. Explains implementation philosophy of attempting to use the computer to improve on the traditional classroom for distance learning. Describes current development objectives.

Yellen, J. (1997, September). Education, distance learning, and the web. Technology Update [Online], 3(6). Available: eShare Technology -
http://www.eshare.com/company/whpaEDL.html
Discusses interactive methodology of distributing web-based course content via BBS and chat. Lists advantages of using chat and BBS technology emphasizing how interactivity improves the quality of the learning environment.

Online Materials - Multi-User Environments:

Cross, J. and Fuglevik, K. Reflections onna MOO [Online]. Available:
http://english.ttu.edu/kairos/1.3/inbox/moo/cvr.html
Gives extensive tips on starting, planning, setting up, and running a MOO. Includes a ten commandants list for educational MOOs that covers teaching pedagogues, users, and security.

Educational Technology: Educational VR (MUD) sub-page [Online]. Available:
http://tecfa.unige.ch/edu-comp/WWW-VL/eduVR-page.html
Gives links for events, general index and information pages, educational MUDs, publications, bibliographies, document indexes, mailing lists, FAQs, manuals, teaching IN/ABOUT cyberspace, clients and servers, 2/3D multi-user virtual worlds, and MUD research.

Higgins, R. N. About MUDs, MOOs, and MUSHy WOOs [Online]. Available:
http://www.cybercorp.net/moochap/
Gives the development of multi-user environments from Dungeons games to current usage. Describes the various M words and designates the differences. Includes links to the major examples of each.

Introductory Guide to the BioGate System [Online]. Available:
http://bioinformatics.weizmann.ac.il/BioMOO/BioGate/
Discusses the BioGate system, how it is used to look around the VR world, the difference between using the Standard Viewer and the Ghost Viewer, how to manipulate objects through the web, how to add images and sounds to objects, how to program objects to be web-aware, and what to do if the connection to the MOO's web system fails.

Newberg, L. and Rouse, R. Integrating the two most exciting internet applications: the world-wide web and multi-user domains [Online]. Available: http://bio-3.bsd.uchicago.edu/Staff/Web_Notes/MOO-WWW.html
Discusses the Phoenix Project which integrates the web and MOO technologies for educational purposes. List sources for further information.

Newberg, L. and Rouse, R. Technical aspects of web/MOO integration [Online]. Available: http://bio-3.bsd.uchicago.edu/Staff/Web_Notes/MOO-technical.html
Discusses technical aspects for web/MOO integration in terms of goals, implementation, URLs, protocols, and presentation. Lists further sources for information.

Rein, R. The Purposes of MOOs [Online]. Available: http://www.itp.berkeley.edu/~engla-cy/rach.html
Explores the purpose of MOOs with links to MOO history and information about WOOs. Classifies the types of MOOs. Gives extensive list of annotated links to MOOs.

Slatin, J. Multi-user environments [Online]. Available: http://www.cwrl.utexas.edu/~slatin/resources/muds.html
Annotates a list of links for multi-user environments for MOOs and WOOs. Classifies the links within categories: information about multi-user environments, environments to explore, research and development, and print materials.

Schneider, D. K. Educational Technology: Educational VR (MUD) sub-page [Online]. Available: http://tecfa.unige.ch/edu-comp/WWW-VL/eduVR-page.html#Educational
Gives extensive information categorized by subjects: events, educational MUD list, publications, bibliographies, MOO/MUD Guides, FAQs and manuals, teaching in cyberspace, teaching about cyberspace, clients and servers, MUD research (technical and general). Maintained by TECFA - Technologies de Formation et Apprentissage ("Training Technologies and Learning") a teaching and research unit within the School of Psychology and Education, University of Geneva.

Schweller, K. Building tools for education. Journal of Technical Reality in Education [Online]. Available: http://tecfa.unige.ch/edu-comp/DUJVRE/vol1/no1/building_tools_for_education.text
Discusses building various tools for MOOs: video camera, slide projector, lecture, conversational robot, classroom, and theater. Lists characteristics of good MOO educational tools.

Smith, J. Frequently asked questions: Basic information about MUDs and MUDing [Online]. Available: http://www.cs.okstate.edu/~jds/mudfaq-p1.html
Defines MUD terms, types of MUDs, commands, etiquette, and help resources.

Smith, J. Frequently asked questions: MUD clients and servers [Online]. Available: http://www.cs.okstate.edu/~jds/mudfaq-p2.html

Covers general information about MUD clients (software) and lists the various types of clients for different operating systems. Includes links.

TECFA - Quick Access Index Page [Online]. Available: http://tecfa.unige.ch/navi/tecfa.html

Covers internal web page: an overview of TECFA, navigation and search tools, programming and authoring tools, pointers for educational technology, and server administration.